



FES 2014, a new tidal model on the global ocean with enhanced accuracy in shallow seas and in the Arctic region

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Thanks to its current accuracy and maturity, altimetry is considered as a fully operational observing system dedicated to scientific and operational applications. In order to access the targeted ocean signal, altimeter measurements are corrected for several geophysical parameters among which the ocean tide correction is one of the most critical. The accuracy of tidal models has been much improved during the last 20 years. Still, significant errors remain mainly in shelf seas and in polar regions. A new global tidal model FES 2012 has been developed in 2012 taking advantage of longer altimeter time series, improved modelling and data assimilation techniques. Compared to other global tidal models, FES 2012 showed very good performances in all shallow water regions, but the validation diagnostics have also pointed out a few regions where the model tends to raise the residual variance; these problems have been partly explained by some local bathymetric issues, such as the Hudson bay for example.

An improved FES 2014 version has been developed in 2014. First, FES 2014 benefits from recent developments in the physical and numerical modelling (T-UGO model) which already allow for dividing the error of the pure hydrodynamic model by a factor two.

As several issues have been detected in FES2012 bathymetry, these have been corrected for FES2014 version. Moreover the grid resolution has been increased in areas of interest like shallow waters and on the slope of the continental shelves.

Additional upgrades have been carried out, such as the use of longer altimeter time series (TP-J1-J2) and new altimeter standards (instrumental and geophysical corrections, and orbits). Moreover a larger assimilation dataset has been considered including tidal gauges and more data all over the ocean and particularly in the high latitudes regions.

FES2014 performances are estimated thanks to a comparison to tidal gauges and altimeter measurements and show a significant improvement particularly in shallow waters and in some part of the Arctic region. Validation results of FES2014 are presented here, including the scores of the pure hydrodynamic simulation, and the scores of the assimilated final atlas with a focus on shallow water regions and in the Arctic Ocean.